BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Qualifications in Engineering
Unit number and title	**Unit 59: Principles of Electrical Machines**
Learning aim(s)	B: Investigate the operation and applications of alternating current (AC) electrical machines as used in industry
Assignment number and title	2: AC electrical machines
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You work as an apprentice in a small engineering company that carries out maintenance activities on a range of electrical machines on behalf of manufacturers. Your Supervisor has asked you to investigate a range of AC electrical machines and to produce a detailed information pack. Your Supervisor has asked you to do this so the manufacturers can refer to this information when discussing the types of maintenance undertaken by your company.

Task 1	You need to research the operation and applications of AC electrical machines. You must use reputable sources of information that can be referenced. At least **four** must be researched, including the following: • Single-phase transformer • Single-phase motor • Single-phase generator • Three-phase induction motor. Your research must focus on the following, for **each** AC electrical machine: • their construction • the components used, their purpose and their effect on overall operation • underpinning theory, theoretical calculations, standard curves and machine characteristics • conditions for optimum performance • two suitable applications. You then need to produce an information pack for **each** of the four machines. For **each** AC machine, the information pack must include: • an evaluation of how it operates - this must: o include details about how the machine is constructed o identify each of the components, including their purpose and their effect on overall operation o justify the underpinning theory, theoretical curves and calculations, for example by using different values for input power, current and voltage, and analyse the characteristics of the machine, for

	example efficiency o detail the conditions for optimum performance, for example to ensure that the variable loss is equal to the constant loss • a justification of two suitable applications, based on the evaluation of how the machine operates. • at least four correctly referenced and reputable sources of information, for example a diagram from an online source [Additional guidance and support - your information pack for each machine must cover: • Single-phase transformer - the application of Faraday's and Lenz's laws • Single-phase motor - the effect of phase shift in creating a pseudo-rotating magnetic field • Single-phase generator - the link between speed of rotation and frequency of the AC signal and the effect of increasing the number of poles in the machine • Three-phase induction motor - synchronous speed and slip as well as determining the torque versus speed characteristic]
Checklist of evidence required	• A detailed report/information pack covering each of the four AC electrical machines that includes diagrams, graphs, calculations etc and suitable references.

Criteria covered by this task:	
Unit / Criteria reference	To achieve the criteria you must show that you are able to:
59 / B.D2	Evaluate, using theoretical data, the conditions for optimal performance and suitable applications for four different types of AC electrical machine
59 / B.M2	Analyse, using theoretical data, the operation of four different types of AC electrical machine
59 / B.P2	Describe adequately, using theoretical data, the operation of a single-phase transformer, motor and generator and a three-phase motor

Sources of information to support you with this Assignment	Books Sahdev S - *Electrical Machines* (Cambridge University Press, 2017) ISBN 9781108431064 Edwards J - *Electrical Machines and Drives* (Palgrave Macmillan, 1991) ISBN 9780333536513 Websites www.electricaleasy.com/p/electrical-machines.html www.electrical4u.com/ www.electricalclassroom.com/electric-machines/